## ABSTRACT

A protective disk for protecting a semiconductor wafer during processing includes an adhesive layer configured to adhere to the semiconductor wafer and a support layer coupled to the adhesive layer configured to provide strength and stiffness to the semiconductor wafer during processing. In one aspect of the invention, the protective disk is soluble in a mildly alkaline or mildly acidic solution. In another aspect, the adhesive layer comprises a high molecular weight polymer. In another aspect, the support layer comprises a polymer and a filler. The present invention may enable a robust, cost-effective, high-volume, automated process for thinning semiconductor wafers below 150$\mu$m, and for subsequent process steps of stress relief and transfer to a dicing frame for die singulation. Additionally, the invention enables use of existing toolsets and processes to produce thinner substrates than conventionally achievable.